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Analysis of precipitation data from in situ and large-scale source in a tropical mountain environment. Study case of the Cordillera Blanca region, Peru.

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The study area, the watershed of the Rio Santa in Peru, accuses a strong longitudinal climatic gradient, from the humid Amazonian lowlands to the drier Pacific coast, associated with an altitudinal gradient, with the highest point of the watershed at 6,768 meters asl. The Cordillera Blanca situated in this area, had more than 600 km^2 of glacier coverage at the end of the 20th century, with more than half that belongs to the watershed of the Rio Santa. The application of a hydrological model in this area requires the analysis and regionalization of precipitation, a key variable for the establishment of a water balance. In this context, different sources of precipitation data are useful in order to catch the spatial and temporal variability: in situ meteorological stations, TRMM 3B42 and 3B43 product satellite data and outputs of WRF model (Weather Research and Forecasting Model) at 3 km of spatial resolution.

Precipitations are dependent on both the large-scale atmospheric circulation and local parameters such as topography or albedo. As all these variables cannot be properly taken into account in large scale models, it is important to evaluate the contribution of regional models in the analysis and the understanding of the spatial heterogeneity of precipitation across a watershed.

To investigate the spatial and temporal variability of precipitations, two approaches have been adopted in this work. In a first approach the spatial repartition of precipitation is described from station data. The second approach is focused on the assessment of a high-scale regional climate model (WRF) and the TRMM satellite data to reproduce spatially and temporally in situ observed precipitations. This comparison was carried out for different time-scale variability: on a monthly time scale with the observation of the seasonal cycle, on the daily time scale to study the occurrence of precipitation, and finally with the hourly data to study the representation of diurnal cycle.

First results show that the strong seasonality of rainfall in this area (more than 80 % of precipitation between October and April) seems better represented in WRF output than in TRMM data. Regarding the diurnal cycle, the WRF model is able to correctly reproduce the main characteristics of the diurnal cycle of precipitation, such as a maximum in the afternoon.